LIVERMORE LAB
REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, Oct. 15-19, 2012

NBC BAY AREA

IT'S A COLD WORLD OUT THERE

Bruce Buchholz loads a sample in the accelerator.

In the United States alone, there are more than 9,000 John Doe and Jane Doe cold cases. In an effort to identify the thousands OF missing persons, Laboratory researcher Bruce Buchholz and a team of international collaborators have found a multidisciplinary approach to identifying the remains of missing persons.

Using "bomb pulse" radiocarbon analysis developed at Lawrence Livermore, combined with recently developed anthropological analysis and forensic DNA techniques, the researchers were able to identify the remains of a missing child 41 years after the discovery of the body.

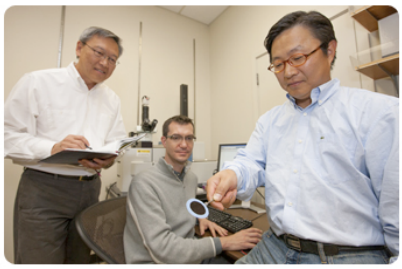
Age determination of unknown human bodies is important in the setting of a crime investigation or a mass disaster, because the birth date and year of death, as well as gender, can guide investigators to the correct identity among a large number of possible matches.

Using the Laboratory's Center for Accelerator Mass Spectrometry, Buchholz determined that the radioactive carbon-14 produced by above-ground nuclear testing in the 1950s and 1960s

remains in the dental enamel, the hardest substance in the body. The radiocarbon analysis shows that dating teeth with the carbon-14 method estimates the birth date within one to two years.

To see more, go to KNTV.

CHEM AND BIO BUG REPELLENT



From left, Kuang Jen Wu and Francesco Fornasiero look on as Sangil Kim holds a piece of the nanotube fabric that repels chemical and biological agents.

Laboratory scientists and collaborators are developing a new military uniform material that repels chemical and biological agents using a novel carbon nanotube (CNT) fabric.

The material will be designed to undergo a rapid transition from a breathable state to a protective state. The highly breathable membranes would have pores made of a few-nanometer-wide vertically aligned carbon nanotubes that are surface modified with a chemical warfare agent-responsive functional layer. Response to the threat would be triggered by direct chemical warfare agent attack to the membrane surface, at which time the fabric would switch to a protective state by closing the CNT pore entrance or by shedding the contaminated surface layer.

Biological agents, such as bacteria or viruses, are close to 10 nanometers in size. Because the membrane pores on the uniform are only a few nanometers wide, these membranes will easily block biological agents.

However, chemical agents are much smaller in size and require the membrane pores to react to block the threat.

To read more, go to *R&D Magazine*.

capital public radio BRINGING PEOPLE BACK TO THE SCIENCE

Ben Santer

When it comes to climate change, the Lab's Ben Santer says it is not a belief system, but a reality. And you can't look at the science through politics or ideologies.

"Bring people back to the science. Do the science and do the research. This is what we know. You may not like it, but don't distort the science," Santer recently said during an interview on Capital Public Radio.

He said when determining whether the climate is changing due to man-made causes it's important to look at more than 10 years of records.

"We're already engaged in a grand geophysical experiment with the earth's climate system by burning fossil fuels, by changing the chemical composition of the atmosphere and changing the earth's climate," he said. "We're no longer innocent bystanders in the climate system; we are active participants. We know that we are largely responsible."

To hear more, go to Capital Public Radio.

Lab Manager MAGAZINE Run Your Lab Like a Business FROM THE LAB TO THE MARKET

LLNL Entrepreneurs' Hall of Fame

A cadre of 15 former Laboratory scientists and engineers has been inducted into the Lab's new Entrepreneurs' Hall of Fame (EHF).

The researchers developed technologies during or after their Laboratory careers that created major economic impacts and spawned important new companies. Once in the commercial world, the LLNL EHF inductees started 23 companies and developed about 50 products.

Four of the companies -- Cepheid, Digital Globe, Valid Logic/Cadence Design and Rambus -- founded or co-founded by six of the inductees have a current valuation of more than $8 billion. In addition, four inductees were leaders in the computer industry and computer-aided design industry in Silicon Valley, collectively starting 13 companies there.

Among the products invented by other inductees are the "mood ring" of the 1970s, the Duracell battery tester, (spawned by Lab research in liquid crystal plastics), the imagery used for Google Earth, the software that first enabled computerized automobile crash and rapid polymerase chain reaction used for DNA analysis.

To read more, go to *Lab Manager*.

Nanotechnology Now
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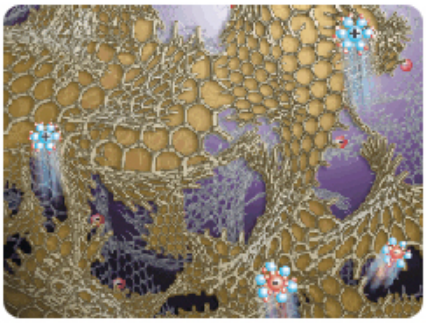
FROM ONE STATE TO ANOTHER



This image represents the 3-D structure of a new polymer-derived nanographene bulk material that consists of a 3-D network of single-layer graphene nanoplatelets.

Laboratory researchers have developed a new bulk material whose physical properties can be dynamically changed by an external signal.

The scientists came up with a method to fabricate mass-producible, graphene-based bulk materials from low-cost, polymer-derived carbon foams by selectively removing carbon atoms from a network composed of both unstructured carbon and graphite nanoplatelets.

These graphene bulk materials have an ultrahigh surface area and may be used for energy storage systems such as super-capacitors where energy is stored by polarization of the graphene electrode/electrolyte interface.

Graphene bulk material also could be used as an electrically conductive network to support the active material in battery applications.

To read more, go to *Nanotechnology Now*

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

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